

Photo by L.W. Morton



Performance-based Environmental Management The Hewitt Creek Model

The Hewitt Creek Model uses a performance-based management process (Figure 1) to set goals that are environmentally sound and economically practical for the watershed. Citizens together decide on incentives for management practices and evaluation of soil condition, nitrogen and phosphorus levels. Farm operators learn to track and interpret performance measures so they can revise their goals and practices for continued improvement. *Sustainability occurs as:*

- 1) citizens engage in setting common goals for their watershed,
- 2) commit to learning from each other and
- 3) support performance measures that help them get to better water outcomes.

Awareness

The model may be initiated by cooperative extension educators, Soil and Water Conservation District commissioners, Farm Bureau members, corn/soybean association members, landowners-citizens, you or me. Four to six watershed residents are contacted and encouraged to *act as catalysts* in their watershed. This core group meets with others to identify water issues and options for solving them.

Contact: Local leaders with passion for the environment and willingness to risk talking with others and to encourage them to work together.

Model Goal for an Agricultural Watershed

Producers and other residents in a watershed community work together to monitor their watershed and select performance-based activities and practices that help them manage sediment, excessive nitrogen, phosphorus, pesticides, herbicides, and other pollutants in their lakes and streams.



Figure 1. The Hewitt Creek Model for Performance-based Farm and Watershed Environmental Management



Phil Hemesath (right), Farm Bureau state board, Northeast Iowa, presents incentives to the Hewitt Creek group for completed activities. Photo by L.W. Morton

How: The leadership group engages others by visiting one-to-one. Then all watershed residents are invited to meet and talk together.

Discussion: Environmental issues, known and suspected. Is the watershed on the EPA list of impaired waters (303 d list)? To what extent are the topography and soils vulnerable to erosion? Have the kinds, sizes, and quantities of fish, birds, and other wildlife changed from what has been there historically? What current farming and land use practices are potential sources of excessive nutrients and sediments or other water problems?

Assessment

The group *discovers the actual environmental condition* of their watershed by seeking research-based data. Existing data on local water bodies and interpretation of their significance are obtained from Extension and university scientists, as well as local, state, and federal agencies. If watersheds do not have systematic or needed data, the group explores possibilities for doing their own monitoring. Assessment includes determination of water chemical and physical characteristics; biotic indexes (fish, clams, invertebrates); land use adjacent to water bodies; land use within the watershed (areas that drain into a water body); natural land and water habitat; and wildlife counts. Extension provides educational programs and helps with activities such as field days, demonstrations, and discussions with other scientists that can build local knowledge.

Setting Goals and Making a Plan

Two kinds of goals are set: Watershed-wide goals and individual farm management goals.

First, *watershed-wide goals* can include removing the water body from the impaired list (regulatory), increasing aquatic (fish) indexes and wildlife diversity, reducing pollutants, reducing stream flow velocity, as well as community goals such as expanding recreational use of the water resource.

In addition, *operators and landowners* within the watershed establish environmental management goals on their own lands using science-based information. These goals could include improvements in soil condition (organic matter, water management, soil carbon), reduction in nitrogen, phosphorus, erosion, and sediment loss.

Specific watershed-wide goal examples are:

- biannual phosphorus testing on *40 percent of the watershed* acres show reduced soil P levels
- operators on *25 percent of the land* complete the Soil Conditioning Index evaluation on two or more fields to determine how to most efficiently increase soil organic matter.

The plan includes identifying what, where, and when along the water body to monitor on a systematic basis to build a data base of past and current trends. These data are used in evaluating whether performance goals have been met and to refine activities and practices to get to goals. The *group decides* who collects the information, where it is archived, and how the information is shared and discussed publicly.

Targeting

After goals are set, the group together targets and prioritizes management practices and activities. They determine priorities by considering how likely it is that the practice will help meet performance goals, and be locally acceptable and practical. These priorities can be assigned a financial value that considers what it will cost the landowner to try them and how important the group thinks that practice is to the watershed (Table 1). Members of the group help each other to match activities to assessed levels of nutrients and soil organic matter management.

In Hewitt Creek, the Iowa and Dubuque County Farm Bureau provided \$30,000 to model how a locally determined incentive program might work. With these funds, the watershed council was able to set financial incentives according to targeted priority activities and practices (Table 1). Thirty five producers self-selected activities and practices that they would undertake in crop year 2005.

Performance

In Hewitt Creek, the watershed group has progressed to incentives for *achieving specific performance goals*, as well as implementing individual management practices (Table 2). These practices and methods of performance measurement have become known and accepted in the community. An incentive program that focuses completely on rewarding objective measures of environmental accomplishment will be implemented in 2006.

The goal of the incentive program is to get to measurable performance outcomes such as reduced nutrient and sediment loss. Hewitt Creek incentives include indexes and tests that assess soil and plant nutrient levels, potential for nutrient losses, and organic matter management. Many different management practices can help achieve performance goals. Some are more locally effective than others. As operators regularly use performance indexes, they can begin to make future management decisions based on their findings. They can also document their accomplishment to the watershed community. The performance incentive program shown

in Table 2 includes payments to cooperators for environmental improvement e.g. lower phosphorous; lower nitrogen; improved levels of soil organic matter. There is also a watershed bonus to all cooperators if participation increases significantly. The council decided on this bonus because broad participation is one of the main priorities to improve water quality.

Evaluation-Sustainability

The performance-based management cycle comes full circle with the evaluation of performance measures against individual and group watershed

Number of Cooperators	Incentive Payment	Water Quality Improvement Activity
14	\$80	Two cornstalk residual nitrogen tests to compare two N and/or manure rates (Sample is 15 8-inch segments).
5	\$25	For each additional cornstalk test to refine N (limit \$100 per operator, includes \$15/sample lab fee).
3	\$50	Phosphorus soil testing and ISU interpretation to identify fields testing VH (more than 21 ppm).
7	\$60	Manure applicator calibration to determine per acre.
14	\$50	Manure analysis to determine available nitrogen, phosphorous and potassium.
13	\$80	Complete P Index on two fields to determine the risk of P Loss – will also receive the Soil Conditioning Index (an indication of soil organic matter management trend.)
4	\$200	Tillage alternatives or no-till field scale comparison of conventional practices demonstration with yield results.
6	\$200	Field scale or small plot comparison of N or P rates with or without manure yields determined. ISU Extension will assist.
12	\$300	Grid sampling 40 or more acres per operator.
25	\$400	New grass waterways per operator.
5	\$200	Seed headlands or other buffers including along streams per operator.
7	\$10/acre	Cover crop seeded after corn silage harvest up to 40 acres per operator.
4	\$120	Tall grass filter below feedlot.
4	\$250	Earthen diversion or roof gutters to keep water off livestock lots. Catch basins to collect solids below feedlot.
5	\$50	Self assessment of farmstead including livestock operation, as appropriate.

goals. Continuous, systematic monitoring of performance indexes and tests on individual fields and farms allows operators to adjust management practices for continued improvement. Residents of the watershed build a collective knowledge, set new goals, and target areas of the watershed for sustainable improvement.

Conclusion

The Hewitt Creek Model for performance-based farm and watershed environmental management is a continuous cycle that builds on shared information and joint planning for getting to better water quality outcomes. For more information about this project go to <http://extension.agron.iastate.edu/waterquality/performance.html>

Table 2. Performance-based Farm and Watershed Environment Management Indexes with Associated Incentive Payment Structure

Phosphorous Index (P-Index) Payment if the weighted whole farm P-Index is *less than a* phosphorous loss risk of 3 (2-5 is medium risk). All field scores weighted by the field size and risk of P loss from each field.

- Bonus if the P-Index is 2 or less (low) or for a 0.2 reduction in P-Index.
- Bonus if all field test within or less than the optimum P university soil test range.

Soil Conditioning Index (SCI) Payment per 0.1 SCI above zero. A weighted average of all tracts in farming operation. Example: a weighted farm average SCI of 0.4 will provide a payment of \$1,200

Major contributing practices to increase SCI include:

- Forages or small grains in rotation and fall cover crops.
- Reduced tillage, soil conservation practices and structures (waterways, contouring, terraces, headland planting, sediment control structures).

Nitrogen Performance Management (Corn Stalk Nitrate-Nitrogen Analysis) Payment if the farm weighted average analyses *does not exceed* 1,700 ppm.

- Bonus if the weighted average of all analyses is less than 1,300 ppm or within 200 ppm of the average of all watershed samples analyzed. Reimbursement is \$80 for the first two nitrate samples (fields) analyzed and \$25 for each additional field.
- Bonus for a wetland impoundment or if drainage tile management of spacing and depth or treatment systems are used to reduce nitrogen.

Other Incentives

- Manure application calibration, manure analysis and revised nutrient plan
- Grid sampling and variable rate fertilizer application (more than 40 acres per year)
- Install an manure settling basin and grass filter or pre-lot water diversion
- Septic system upgrade. (Low interest revolving loans available)
- Stream fencing for graziers

Watershed Environmental Performance (add-on bonus)

- After 20 percent of the land in the watershed is enrolled in this program, a bonus is paid *for each 10 percent increase*.
- Payable to cooperators earning \$1,500 or more watershed improvement incentives per farm operation.
- A bonus also would be paid when three years of *monitoring show evidence of reduced* contaminant delivery.

Prepared by Lois Wright Morton, John Rodecap, Susan Brown, and Gerald A. Miller, Iowa State University Extension 2006.

File: Air and Water Quality 1-2

This material is based in part on work supported by the Cooperative State Research, Education and Extension Service, U. S. Department of Agriculture, under Agreement No. 2004-51130-02255. Any opinions, findings, conclusions or recommendations expressed are those of the authors and do not necessarily reflect the view of the U.S. Department of Agriculture. This work has also been supported by the Iowa Farm Bureau Federation, the Dubuque County Farm Bureau, and the Iowa Corn Growers.

...and justice for all

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Many materials can be made available in alternative formats for ADA clients. To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964. Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Jack M. Payne, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.